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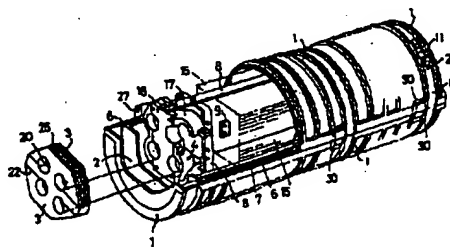
**(54) END FACE PLATE OF CLOSURE FOR CABLE
CONNECTION**

(57) Abstract:

PURPOSE: To make it easy to set a cable connection in a cable connection housing, enhance safety and hermeticity, and significantly improve assembling workability.

CONSTITUTION: A sleeve 1 is vertically divided into two in the axial direction to form butting mating faces. The opposed mating faces are coupled together by a securing means, and the divided halves of the sleeve are thereby integrated into one to form a closure. At least one insertion hole 20 is formed in an end face plate 3 to be attached to the sleeve 1. Slits 22 that connect to the insertion holes 20 are formed in the periphery of the end face plate so that the periphery can be opened at the slits 22. This makes it possible to simply fasten the sleeve using a fastener with the mating faces of the halves of the sleeve butted together. This remarkably facilitates the work of leading cables out of, covering and housing, the cable connection, and ensures the sleeve with reliable hermeticity.

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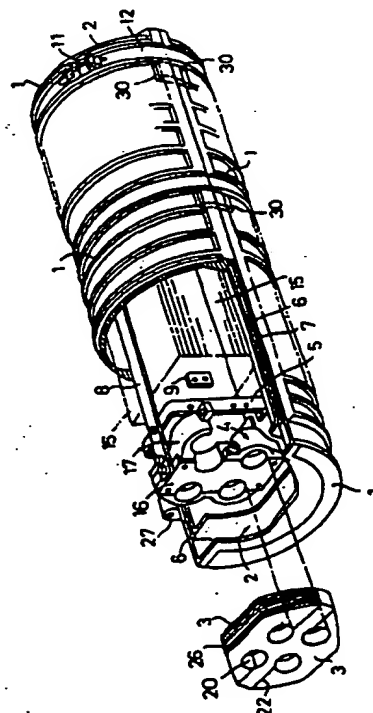
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(54)【発明の名称】 ケーブル接続用クロージャにおける端面板

(57)【要約】

【目的】 ケーブル接続部収容体へのケーブル接続のセット取扱いを容易にし、安全性と気密性をも高めると共に、組立て作業性を大幅に向上する。

【構成】 スリーブ1の軸方向に縦割りに二分割する突き合わせ接合面を形成し、該分割スリーブの互いに対向した接合面を固定手段で連結一体化したクロージャにおいて、前記スリーブ1に付設される該端面板3にケーブル挿通孔20を少なくとも一つ形成し、該ケーブル挿通孔20に連通するスリット22を端面板外側面に貫通して設けてスリット22で切開かれた端末を拡開しうるように構成した端面板としたことにより、スリーブの接合面を突き合わせて締結具で締め付けることが簡便にでき、ケーブル接続部のケーブル導出被覆収容作業を著しく迅速に行え、スリーブでの信頼性の高い密封を確保できる。



【特許請求の範囲】

【請求項1】 ケーブル接続部の周囲を覆う円筒状のスリーブに、スリーブを軸方向に二分割する突き合わせ接合面と、該スリーブの両端に、前記ケーブル接続部の両側のケーブルを貫通する端面板とを備え、該スリーブの互いに対向した接合面を固定手段で連結一体化したクロー

ージャにおいて、前記端面板にケーブル挿通孔を少なくとも一つ形成し、該ケーブル挿通孔に連通するスリットを端面板外側面に貫通して設け、該スリットで切開された末端を拡開しうるように構成したことを特徴とするケーブル接続用クロージャにおける端面板。

【請求項2】 前記端面板が、スリーブの両端内周に形成した側面嵌合部に嵌入される小判形のゴム弾性体からなり、複数の等径または異径のケーブル挿通孔にそれぞれ薄肉キャップ部を有し、該薄肉キャップ部を選択的に切除して貫通孔として用いる請求項1記載の端面板。

【請求項3】 前記端面板が、水平面に対して傾斜したスリットを有するケーブル挿通孔を備え、該スリットを挟んで両側に跨がって開き止め接続片を嵌合保持している請求項1または2記載の端面板。

【請求項4】 前記端面板が、その外周に複数条の山溝を備え、ガスケット機能を持たせて使用される請求項1、2または3記載の端面板。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、光ケーブルなどの通信ケーブルの接続部を保護するためのクロージャ、特に光ケーブル用クロージャにおける端面板の改良に関するものである。

【0002】

【従来の技術】 一般に、ケーブル接続用クロージャは、ケーブル接続部の両側のケーブルを貫通して取付けられた端面板と、前記接続部をかぶせて収容する縦割りの円筒状のスリーブとからなり、両端面板間にスリーブを装架して、該スリーブの互いに対向した分割突き合わせ部分をボルトまたはバンドなどの固定手段で連結して一体化し、ケーブル接続部を気密に保護する構造のものが多用されている。

【0003】 従来のケーブルの接続部を保護する収容体のスリーブは、スリーブの変形防止の剛性を保ち、湿気の浸入を阻止しなければならないために、スリーブの各構成部分は互いに密に結合され、かつケーブル端との間の結合も密でなければならず、端面板から導出されるケーブルのセット取扱いが煩雑で気密材を設けたケーブル収容体は、製作煩雑で高価となり経費を要するし、耐久性の面でも問題があって、端面板を用いても気密確保のために締め付け力の管理や組立作業性が煩雑となって問題があった。本発明は、これら従来の欠点を排除しようとするもので、ケーブル接続用クロージャにおいてケーブル接続部の収容体の変形防止を図り、ケーブルの組立

セットが簡便で安全性と気密性をも高めると共に、組立作業性を大幅に向上できるケーブル接続用クロージャに用いられる端面板を、構成簡単で安価な形態で提供することを目的とするものである。

【0004】

【課題を解決するための手段】 本発明は、ケーブル接続部の周囲を覆う円筒状のスリーブに、スリーブを軸方向に二分割する突き合わせ接合面と、該スリーブの両端に、前記ケーブル接続部の両側のケーブルを貫通する端面板とを備え、該スリーブの互いに対向した接合面を固定手段で連結一体化したクロージャにおいて、前記端面板にケーブル挿通孔を少なくとも一つ形成し、該ケーブル挿通孔に連通するスリットを端面板外側面に貫通して設け、該スリットで切開された末端を拡開しうるように構成した端面板としたものである。

【0005】

【作用】 ケーブル外被を必要長さ剥ぎ取り、内部のスロットロッドを剥ぎ取り際から所定寸法で切断したのち、テンションメンバを所定寸法になるようスロットロッドをカッタ等を使用して裸にしてケーブルの接続の準備を終了させる。ケーブルの所定位置の外被を円周方向に研磨清掃し、ケーブルスペーサを嵌挿させたのち端面板のケーブル挿入孔になる薄肉キャップ部と斜スリット部を切除開口し、スリット末端を拡開してケーブルを挿入しケーブル挿入孔に貫通させ、スリット部に山溝付のシール部材を装着し、接続片を嵌装してスリットを閉塞保持させ、該端面板外周部のスリット部を覆うようにテープ状ガスケットをなじませるように接着させる。その後、ケーブル把持金具を必要なスペーサを用いてケーブル外被に装着し、締結ボルトにより所定トルクで締結してからテンションメンバをテンションメンバ把持金具にテンションメンバ把持具を用いて締結ねじにて必要トルクにて締め付ける。そして下スリーブに端面板を押しつけつつ、端面板ガスケットになじませてから、上スリーブをかぶせ、スリーブ相互を押えつけて中央部分から外へ相互に締結具を順次締めつけ取り付けて、所定のトルクで数回に分けて締結して組立てられ、ケーブルシール材や端面板の取付け姿勢を安定強固にすると共に、密封性も大幅に高められ、バルブより注入されたガスによってクロージャとして安全に用いられるものである。

【0006】

【実施例】 本発明を図1乃至図15の円筒状のスリーブ1と、スリーブの側面嵌合部2に嵌装された端面板3とを備えたクロージャの例で説明すると、端面板3、3に、幹線光ケーブルが貫通されてケーブル把持金具4で固定され、かつ、該ケーブルのテンションメンバが、テンションメンバ把持金具5に接続連結されている。前記スリーブ1は、円筒状のハウジングで、軸方向に沿って両側が分離接合面で上下に分割できるようにしたもの

した難燃性のFRPP或いはスチレン系、またはオレフィン系の熱可塑性エラストマーなどから構成され、軸方向に縦割りに二分割する突き合わせ接合面と、該スリーブ1の両端に、嵌装される端面板3、例えば耐候性、耐オゾン性等の諸特性に優れたEPDMなどのゴムスペーサとを備え、該端面板3にケーブル挿通孔20を少なくとも一つ形成し、該ケーブル挿通孔20に孔を覆い切離しうる薄肉キャップ部21を一体に備え、ケーブル挿通孔20に連通するスリット22を端面板3の外側に貫通して設けて、スリット22で切開された末端を拡開しうるように構成してある。この端面板3の対面する接合面を含み、前記スリーブ1の分割接合面にガスケット7を嵌合挟持しうる凹溝6を備え、端面板3に対向する内面に、ケーブル外周に沿う押え挟持片からなるケーブル把持金具4と、テンションメンバ把持金具5およびテンションメンバ接続具9とを設けた連結金具8を固定装備し、さらに分割スリーブの対向接合面を締結するバックル30を備え、必要に応じ前記スリーブ1の外周にネジからなる締結具11のあるバンド12を着脱自在に巻回配備し、分離面での密封性が高められて連結できるようにしてある。

【0007】このバンド12としては、スリーブ1に巻回できる帯状金属板などで形成され、その両端にフックを設け、該フックに係合された係合片を介してボルト11が螺合されてフック間を接離自在に連結できるようにしてあるが、スリーブ1の外周にリブ（図示せず）を突設して、リブ間の凹部にバンド12を巻回装着して外れ防止に役立たせることも配慮される。

【0008】前記スリーブ1は、上下に分割可能な形態として端面板3間にシール材を介在させて、前記スリーブガスケット7と共に、クロージャ内の気密性を維持できるようにしてあり、互に対向した接合面を固定手段で連結一体化できるようにしてある。即ち、スリーブの長手方向の片側を固定ヒンジまたは脱着ヒンジのヒンジ機構で連結し、他側に締め付け或いは締め付け、増し締めできるバックル30とを備えてある。（図9乃至図15）

そして前記端面板3としては、小判形或いは楕円形、円形などのゴム弾性体からなり、複数のケーブル挿通孔20にそれぞれ薄肉キャップ部21を有し、該薄肉キャップ部21を選択的に切除開口して貫通孔として用いるようになっていて、ケーブルを嵌挿しやすく水平面に対して傾斜したスリット22を有するケーブル挿通孔とし、該スリット22を挟んで両側に跨がって接続片24を嵌合保持する凹面部23に備えていて、スリット22にシール部材25を当てがって、接続片24により締結される構成となっていて、ケーブル挿通孔をクロージャの内外に貫通するようにしてある。（図5乃至図8）

【0009】なお、前記ケーブル挿通孔20、20で形成される貫通孔またはケーブル導出孔には、ゴム製など

でのスペーサ43、或いはエアタイトテープを巻き付けてケーブルの外周面を密着できるようにすることが配慮されている。前記スリーブ1から導出されるケーブルの周囲に備えられる中空円筒状のスペーサ43は、一方に拡開できるように該スペーサ43の片側にケーブル差込み挿入用のスリット44を設けると共に、スペーサ43の内周および外周にリング状に山溝45、46をそれぞれ備え、気密性の確保を容易にし、かつ組立、解体性の取扱作業の簡便化をはかるのがよい。（図16）

【0010】このスペーサ43は、ゴム弾性体を自然環境化で使用するもので、環境温度に対応して収縮、膨張できるように、外周とスリーブ間、ケーブル挿入孔の内径とケーブル外周間に圧力変化に対応するスペーサと、圧力変化を極力少なくすることで、圧縮応力の確保、低温収縮防止を図り、さらにスペーサ43はスリット加工してケーブル挿入しやすくし、外周面または／及び内周面にはリング状の山部を複数突出設けてある。前記端面板3のケーブル挿入孔20に於いて、外径の異なるケーブルが挿入される場合、同一径の挿入孔で対応可能とするために、外径は挿入孔と同一とし内径はケーブル外径に対応したケーブルスペーサ43にてその内径、外径に山溝を設けて、ケーブルにセットすることで気密性を確保出来る構造とするのがよい。

【0011】また、前記端面板3の内面側に対向してスリーブ1に固着した連結金具8上の両端にケーブル把持金具4、4を取付ネジで、またテンションメンバを把持金具5に固定ネジで順次取付け、中央部に一對のリング14、14のある収納用取付金具、例えば収納トレイ15を設け、芯線を分配ガイドして接続できるように、テンションメンバ接続具9を配備しうるようにしてある。（図1及び図17並びに図18）

【0012】前記ケーブル把持金具4としては、図17のようにケーブル挿通凹部161のある受具16にケーブル外周に沿う彎曲保持片17をピン18で回動自在に設けて開閉させて、ネジ19でケーブルを挟持固定化するようにしてケーブル把持が簡便にできるようにしてある。即ち、ケーブル挿通凹部161を一体で複数設けた受具16と、該受具16に着脱可能なピン18によるヒンジ機構を回転自在に枢着された彎曲保持片17と、彎曲保持片17を、前記受具16に脱着する取付ネジ19とから構成されてケーブルを把持できるもので、受具内面、彎曲保持片内面には山形状の凸起が複数設けてあり、ケーブル外被に噛み込んで把持力を得られるようにしてある。なお、前記保持片17は、受具16に着脱自在に設けた脱着構造とすることもできる。

【0013】また、テンションメンバ把持金具5に取付けたケーブルテンションメンバは、単穴或いは複数穴タイプを用いるが、取付板にアームを介してケーブル挿入部を1から複数まで設けたもので、スリーブ1内に固着されてケーブルを保持する。例えば、前記スリーブ内に

設けられるケーブルテンションメンバ把持具51は、図19の如くケーブルを嵌挿する挿通部47を単数または複数アーム48を介して取扱板49に備え、前記挿通部47に固定締付ネジ50を備えたものを用い、前記テンションメンバ把持金具51に取付けて1本または複数本のケーブル中心のテンションを掛けた装備が容易にできる。なお、前記スリーブ1或いは端面板3にはバルブのあるガス注入口部(図示せず)を設けて、該ガス注入口部から封入ガスを注入してクロージャ接続部の保護を確実にするようにしてある。

【0014】このような構造の接続部を組み立てる場合、各ケーブルにスペーサ43を装着し、或いはケーブルシール材を巻き付け、ケーブルの端部の外被をケーブル把持金具4により固定したのち、端面板3の接合面にシール材及びスリーブ1の接合面にガスケット7を介して分割スリーブ1、1の接合面を突き合わせて、該スリーブの外周にあるバックル30を締め付け、さらに締結具11のあるバンド12を巻回して締結具11を締め付けて固定するもので、順次所定間隔ごとにバックル30の取付けと、締め付けを繰り返してスリーブ1の全長にわたって気密維持を強固にし信頼性の高い密封構造にすることができる。なお、この組立状態において、縦割りの接合面間にはスリーブガスケット7が径方向に圧縮されていることで、比較的小さい挟持力で高い気密性を保持することができ、また端面板3とケーブルとの間にはスペーサが、ケーブル長さ方向に介在されシール材があって、スリーブ1、1の姿勢が安定すると共に組立てを容易にするし、気密性を著しく向上できる。このスリーブガスケット7は、断面形状を長方形として角部に丸味をつけて、上下面に凹溝を形成してリップ効果を持たせるようにし、組立性・気密性の向上を図ることが考慮されている。

【0015】一方、前記スリーブ1、1の締結状態を解除するときには、締結具11のボルトを緩めてバンド12をスリーブ1、1から外し、バックル30の締結を解除して端面板3からスリット開き止め用の接続片24を外し、スリーブ1の接合面を離間して分割すれば、ケーブルの交換も容易にすることができる。

【0016】前記スリーブ1の分割縁部には、図2のように対応して、引掛ヒンジ27、挿入穴28のヒンジ機構を設けて脱着できるようにしてあって、該引掛ヒンジ27を挿入穴28に現場にて嵌合後、バックル30を掛止してしめつけるだけで、上下スリーブ1、1が簡単に正合できるようにしてある。即ち、前記ヒンジ機構は、複数本のピンとそれらに対応する挿通孔とからなり、或いは複数の挿入孔に貫通する単一の支杆で固着または着脱自在に設けられている固定ヒンジまたは脱着ヒンジとする。

【0017】なお、前記端面板3としては、図5乃至図8の如くゴムスペーサで等径または異径の4穴のケー

ル挿通孔20があって、穴ごとにスリット22があり、その端末を開けることで、ケーブルを挿入嵌合できる形態となっていて、ケーブル挿通孔20の穴径とケーブル径の変化対応は、端面板3を介して行うようにしてある。前記スリット22の中間部にプラスチックで両面に山溝を設けた合わせ目スペーサが、挿入可能となる構造としてあり、斜めのスリット22は、ケーブルが挿入されない時は端面板3の片面と外周面が薄肉で塞がれてあり、ケーブル挿入時に挿入孔のキャップ部21を切除して開くことができ、作業性の向上と気密信頼性の向上をはかっている。前記スリット22を切除して使用する場合には、ケーブル挿入後、再度閉じる工程時に切除された外周部の開く作用やズレを防止するために開き止め金具としての接続片24が凹面部23に付設される。また、端面板3の最外周面は、全周に渡って複数の山溝26を設けてあり、スリーブ内面との圧縮力が得られて気密性を保つと共に、内部へ伝達される圧縮力によりケーブルとの気密性が得られるようにしてある。即ち、スリーブ1の嵌合部2と、端面板3との気密保持機構は、端面板3の外周に山溝26を設け、バンドの締め付け力をスリーブ1が受け山溝26に伝わって気密を保持できるようにし、端面板ガスケットを不要として組立解体作業性を向上できるようにしてある。

【0018】前記心線取付金具の収納トレイ15は、図18に示す如く1テープ毎に固定方式として5〜20テープ/1トレイの実装ができるようにし、この収納トレイを多段に重積しヒンジ部で連結して必要トレイの位置が開放でき作業性を向上できるようにしてある。なお、前記スリーブ1としては、長手方向に沿って縦割りで上下に二分割される半円筒体の対で構成され、スリーブの分割接合面に行くに従って厚肉部に形成し、かつ外接合面に凹溝6を備えていて気密性の維持を確実化できるようにしてあるが、前記端面板3を省略したケーブル直接挿入形状とすることも選んでできる。

【0019】また、スリーブは図20及び図21に示すような端面板3を選んでスリーブとの組立密封構造としてもよく、該端面板3には外周に全周にわたって複数山溝26を設けて、スリーブ内面との圧縮力が得られて気密性を保つと共に、内部へ伝達される圧縮力によりケーブルとの気密性を保つようにしてある。なお、前記端面板3に中央スペーサ29を必要に応じ設け、複数のケーブル挿通孔20に形成した薄肉キャップ部21を選択的に切除開口して貫通孔として用いるようになっていて、さらにケーブルを嵌挿しやすく水平面に対して傾斜した或いは平行なスリット22を設け、該スリット22を挟んで両側に跨がって接続片を嵌合保持する凹面部23に備えていて、スリット22にシール部材25を当てがって、接続片により締結される構成となっていて、ケーブル挿通孔20をクロージャの内外に貫通するようにしてある。

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【0020】前記スリーブ1, 1の分割接合面の密接固定化には、図22の如く、スリーブの分割縁部の長手方向の片側をピンの引掛ヒンジ27と挿入穴とからなる脱着ヒンジとし、他側を回動自在のバックル30にて締め付け可能にすることで、作業性の向上を図り、また、ヒンジ側のスリーブ凹溝6に設置したスリーブガasket7が、ヒンジを支点としてスリーブ1を閉じる方向に回転することにより、自動的に上下スリーブ1, 1の凹溝6に収まるようにすることもできる。なおヒンジ機構としては、上下スリーブ1に固着したり、一方のスリーブにピンを長手方向に装着され、他方のスリーブに挿入孔を対設して脱着することが選べる。前記バックル30としては、フックを引掛け、ハンドル操作によるワンタッチで上下スリーブ1, 1を所定の寸法まで締結後に、さらにその寸法を接近できる増し締め機構、例えば、ネジ杆とナットを備えて調整できるようにしたものを用いるのがよい。

【0021】

【発明の効果】本発明は、ケーブル接続部の周囲を覆い、ケーブルを導出する円筒状のスリーブを軸方向に二分する突き合わせ接合面を形成し、該分割スリーブの互いに対向した接合面を固定手段で連結一体化したクロージャにおいて、前記ケーブル接続部の両側に端面板を備え、該端面板にケーブル挿通孔を少なくとも一つ形成し、該ケーブル挿通孔に連通するスリットを設け、該スリットで切開された端末を拡開するように構成した端面板としたことにより、スリーブの接合面を突き合わせて締結具で締め付けることが簡便にでき、ケーブル接続部の被覆収容作業を著しく迅速に行うことができ、しかも少ない締め付け個所で端面板を均一に圧迫して信頼性の高い密封を確保できると共に、スリーブの姿勢も安定して取扱い良好で、組立作業の容易化に役立ち、接続固定も楽に安全に行え構成も簡単で、安価な形態にすることができる。

【図面の簡単な説明】

【図1】本発明の実施例を示し、一部を分離し、切欠し内部を表した使用状態の斜視図である。

【図2】図1のスリーブの一部の分離斜視図である。

【図3】図2の正面図である。

【図4】図1の例の組立状態の一部切断側面図である。

【図5】図1の例の端面板の拡大正面図である。

【図6】図5のA-A線における切断平面図である。

【図7】図5のB-B線における切断側面図である。

【図8】図5の外側からみた側面図である。

【図9】図1のスリーブの一部切断側面図である。

【図10】図9の例の底面図である。

【図11】図9のC-C線における切断正面図である。

【図12】図9のD-D線における切断正面図である。

【図13】図9のE-E線における切断正面図である。

【図14】図10のF-F線における拡大切断正面図である。

ある。

【図15】図10のG-G線における拡大切断正面図である。

【図16】スペーサの一実施例で、(a)は側面図、(b)は正面図、(c)はY-Y線における縦断面図である。

【図17】図1の例のケーブル把持金具の正面図である。

【図18】図1の例の収納用トレイで、(a)は側面図、(b)はその平面図である。

【図19】ケーブルテンションメンバ把持具の一実施例で、(a)は正面図、(b)は平面図である。

【図20】端面板の他の実施例で、(a)は正面図、(b)は一部切断平面図、(c)は縦断面図である。

【図21】端面板のさらに他の実施例で、(a)は正面図、(b)は一部切断平面図、(c)は側面図である。

【図22】本発明のスリーブの他の実施例の一部切欠状態の斜視図である。

【符号の説明】

- | | |
|-----|--------------|
| 1 | スリーブ |
| 2 | 側面嵌合部 |
| 3 | 端面板 |
| 4 | ケーブル把持金具 |
| 5 | テンションメンバ把持金具 |
| 6 | 凹溝 |
| 7 | スリーブガasket |
| 8 | 連結金具 |
| 9 | テンションメンバ接続具 |
| 11 | 締結具 |
| 12 | バンド |
| 14 | リング |
| 15 | 収納用トレイ |
| 16 | 受具 |
| 161 | ケーブル挿通凹部 |
| 17 | 挟持片 |
| 18 | 枢支 |
| 19 | ネジ |
| 20 | ケーブル挿通孔 |
| 21 | 薄肉キャップ部 |
| 22 | スリット |
| 23 | 凹面部 |
| 24 | 接続片 |
| 25 | シール部材 |
| 26 | 山溝 |
| 27 | ヒンジ |
| 28 | 挿入穴 |
| 29 | スペーサ |
| 30 | バックル |
| 31 | ブラケット |
| 32 | ハンドル |

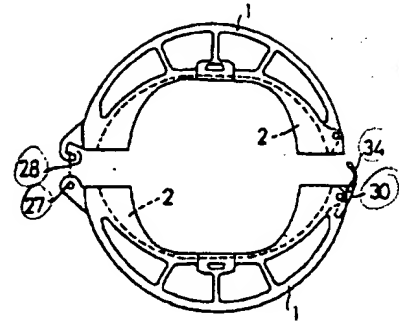
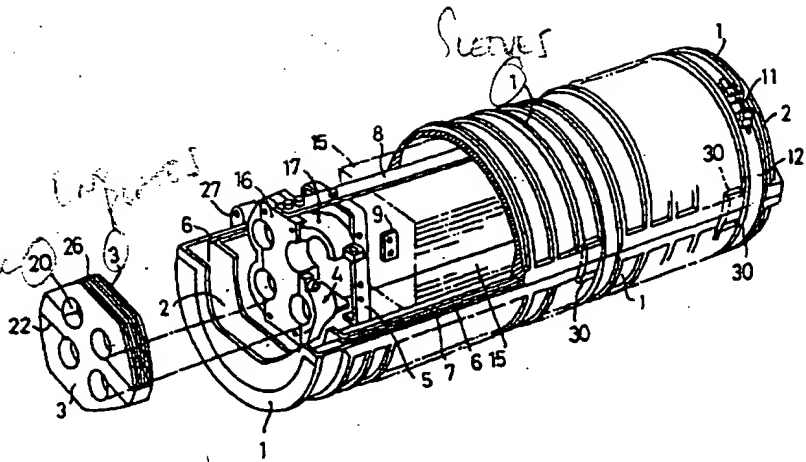
33 回転部材
34 ネジ杆
35 ピン
36 ナット
37 フック部

38 ピン
43 スペーサ
45, 46 山溝
51 ケーブルテンションメンバ把持具

Translation

【図1】

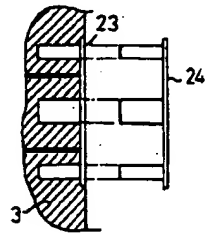
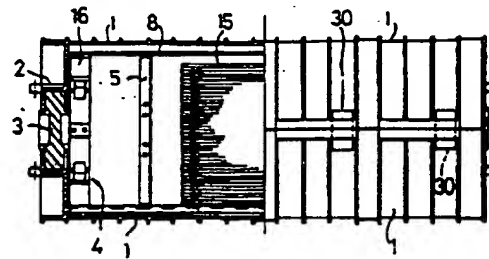
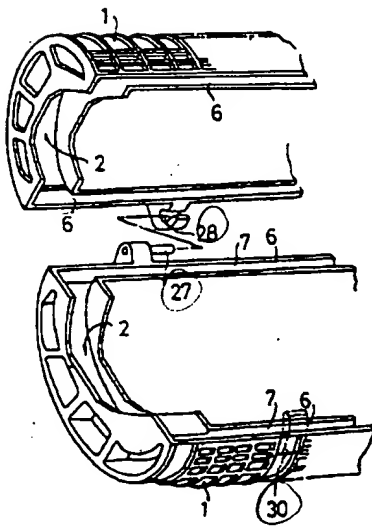
【図3】



【図7】

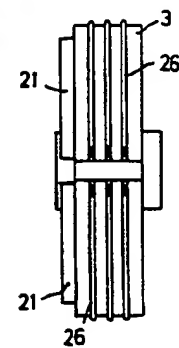
【図2】

【図4】



【図8】

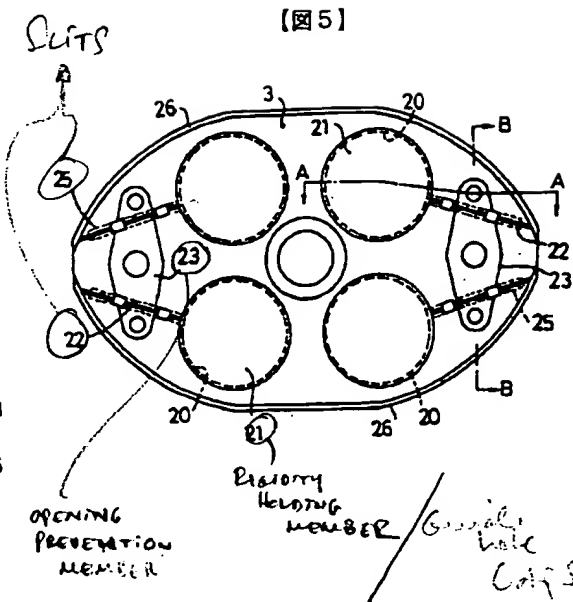
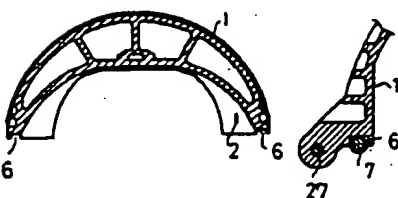
【図5】



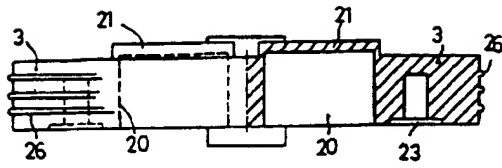
【図15】

【図11】

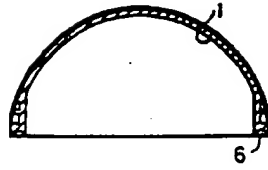
【図14】



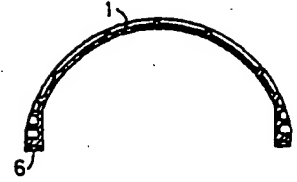
【図6】



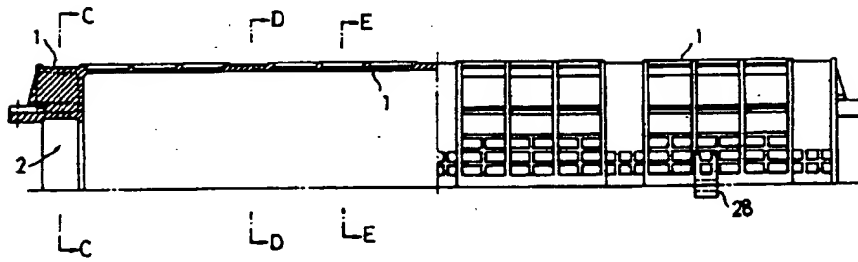
【図12】



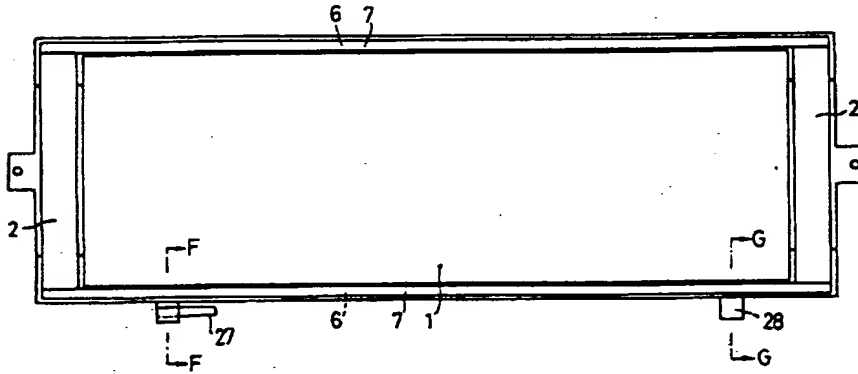
【図13】



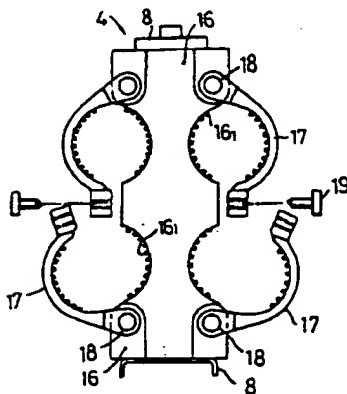
【図9】



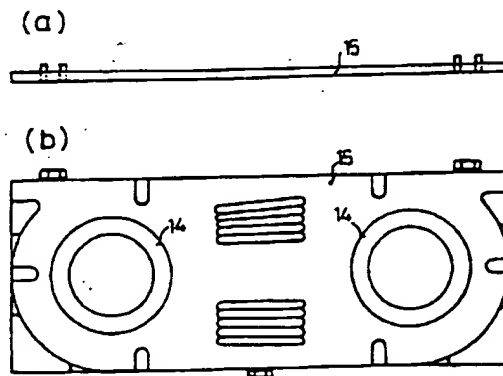
【図10】



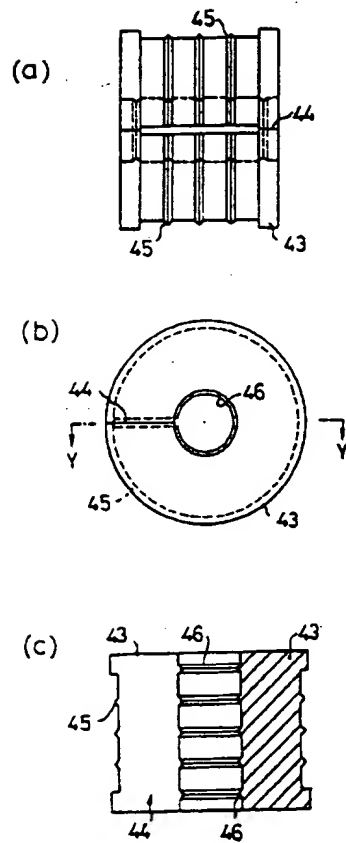
【図17】



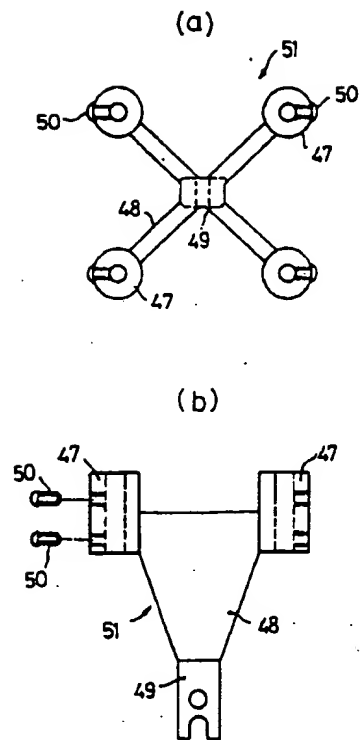
【図18】



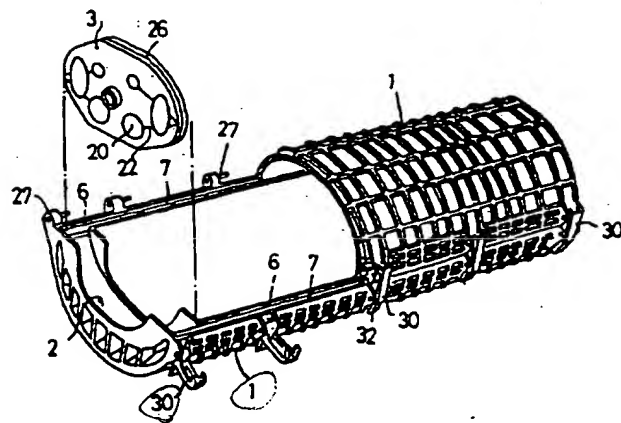
【図16】



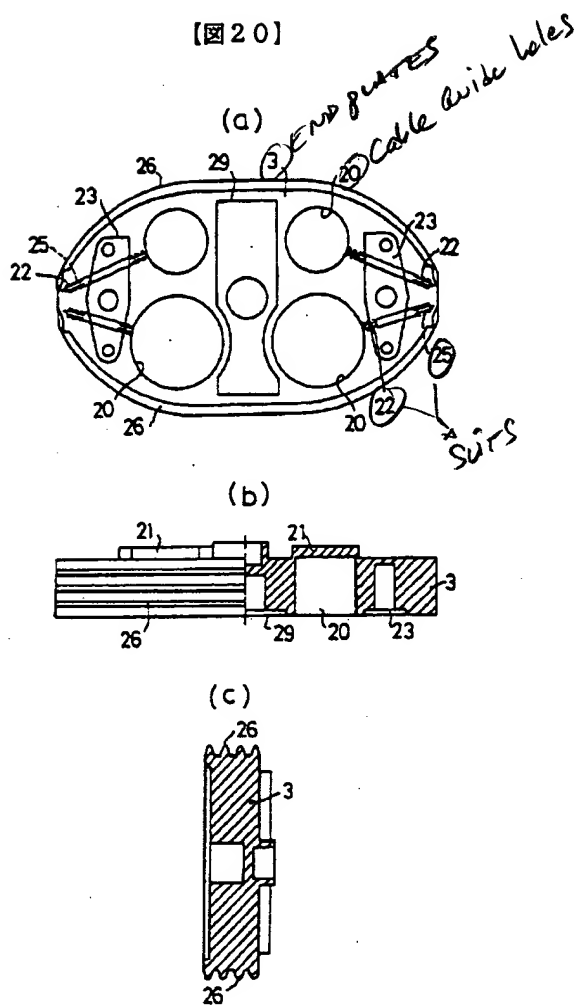
【図19】



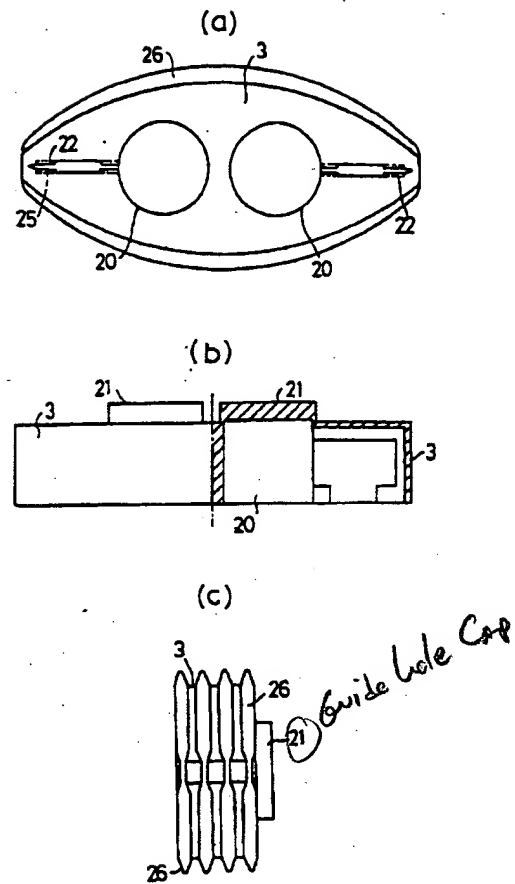
【図22】



【図20】



【図21】



フロントページの続き

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Japanese Patent

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EDGE PLANE PANEL FOR A CABLE CONNECTION CLOSURE

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(54) Title of the invention

Edge plane panel for a cable connection closure

(57) Summary

Objective: to facilitate the handling of a cable connection set for a cable connection unit housing material, to upgrade the safety and hermeticity, and to significantly improve the assembling operative efficiency.

Constitution: In a closure wherein oppositional junction planes yielding a pair of lengthwise divisions are formed along the axial direction of the sleeve (1) and wherein the mutually opposing junction planes of said sleeve divisions are linked and integrated via a fixation mechanism, at least one cable insertion hole(s) (20) is formed on the edge plane panel (3) configured auxiliarily on the aforementioned sleeve (1), whereas the slit (22), which is linked to said cable insertion hole (20), is configured to punch through the outer plane of the edge plane panel, whereas it becomes possible, based on such an edge plane panel constitution wherein the divided and opened terminal is expanded by said slit (22), to tighten the mutually opposing junction planes of the sleeve via a clamping mechanism easily, to significantly accelerate an operation for housing the cable lead-out coat of a cable connection unit, and to ensure a high sleeve hermetic sealing reliability.

¹ Numbers in the margin indicate pagination in the foreign text.

Claim 1

An edge plane panel for a cable connection closure with the following characteristics: In a closure wherein oppositional junction planes yielding a pair of divisions are formed along the axial direction of a cylindrical sleeve which surrounds and blankets a cable connection unit and edge plane panels which are punched through by cables on both sides of the aforementioned cable connection unit are possessed by said sleeve and wherein mutually opposing junction planes of said sleeve are linked and integrated via a fixation mechanism,

At least one cable insertion hole(s) is formed on the aforementioned edge plane panel, whereas

A slit linked to said cable insertion hole(s) is configured to punch through the outer plane of the edge plane panel, whereas

The terminal cut & opened by said slit is expanded.

Claim 2

An edge plane panel specified in Claim 1 wherein the aforementioned edge plane panel is made of a Japanese gold coin-shaped rubber elastomer scheduled to be locked into profile plane interlock units formed on the respective inner circumferences of both edges of the sleeve and possesses thin cap units on multiple cable insertion holes with identical or different sizes and wherein said thin cap units are selectively cut & removed and used as punch-through holes.

Claim 3

An edge plane panel specified in Claim 1 or 2 wherein the aforementioned edge plane panel possesses a cable insertion hole in possession of a slit slanted in relation to the horizontal plane for interlocking and retaining an opening stopper connection piece in a straddling fashion on both sides of said slit.

Claim 4

An edge plane panel specified in Claim 1, 2, or 3 wherein the aforementioned edge plane panel possesses multiple mountain channels on the outer circumference thereof for serving a gasket function during its use.

Detailed explanation of the invention

[0001]

(Industrial application fields)

The present invention concerns a closure for protecting the connection units of communications cables such as optical cables, etc., and in particular, it concerns an improvement of an edge plane panel for an optical cable closure.

[0002]

(Prior art)

Generally speaking, one characterized by a structure which consists of edge plane panels attached to both sides of a cable connection unit in a state where they are being punched through by cables and a lengthwise divided cylindrical sleeve for housing the

aforementioned connection unit in a blanketing fashion, wherein said sleeve is spread between both edge plane panels, and wherein mutually opposing divided members of said sleeve are linked and integrated via a fixation mechanism (e.g., bolt, band, etc.) for hermetically protecting the cable connection unit is being extensively used as a cable connection closure.

[0003]

The sleeve of the housing material that protects the connection unit of the cable of the prior art must meet the requirements of maintaining a sufficient rigidity for preventing the sleeve deformation and of blocking the entry of humidity, and therefore, it is necessary not only to couple the respective sleeve components hermetically but also to couple the cable terminals hermetically, due to which the set handling of cables retrieved from the edge plane panels becomes cumbersome, and not only is it cumbersome to prepare a cable housing material on which hermetic materials are configured, but the cost also appreciates, accompanied by a problem in endurance, and even if edge plane panels are used, cumbersome operations are required for assembly and for managing the tightening force from the standpoint of securing the hermeticity, which is problematic. The objective the present invention, which represents an attempt to eradicate these shortcomings of the prior art, is to provide a edge plane panel for a cable connection closure which is characterized by a simple constitution and an inexpensive morphology and which is capable of preventing the deformation of a material for housing a cable

connection unit within the cable connection closure, of simplifying the cable assembly set, of improving the safety and hermeticity, and of significantly improving the assembly operative efficiency.

[0004]

(Mechanism for solving the problems)

The following edge panel plane constitution is provided by the present invention: In a closure wherein oppositional junction planes yielding a pair of divisions are formed along the axial direction of a cylindrical sleeve which surrounds and blankets a cable connection unit and edge plane panels which are punched through by cables on both sides of the aforementioned cable connection unit are possessed by said sleeve and wherein mutually opposing junction planes of said sleeve are linked and integrated via a fixation mechanism, at least one cable insertion hole(s) is formed on the aforementioned edge plane panel, whereas a slit linked to said cable insertion hole(s) is configured to punch through the outer plane of the edge plane panel, whereas the terminal cut & opened by said slit is expanded.

[0005]

(Functions)

An outer cable coat is stripped over a necessary length, and after the slot rod in its interior has been cut off at a certain dimension from the stripping edge, the slot rod is stripped bare

by using a cutter, etc. for obtaining a tension member of a certain dimension, as a result of which the cable connection preparation is completed. The outer coat at a certain position of the cable is polished and cleaned over its circumferential direction, and after it has been inserted into and transmitted through a cable spacer, a thin cap unit and a slanted slit unit scheduled to become a cable insertion hole for the edge plane panel are cut & opened, and after the slit terminal has been expanded, the cable is inserted into and transmitted through the cable insertion hole, whereas a sealing component equipped with mountain channels is fitted into the slit unit, and after a connection piece has been locked into it, the slit is retained in a closed state, and a tape-shaped gasket is adhered in a shape-accommodating fashion in such a way that it will blanket the slit unit on the outer surface of said edge plane panel. A cable gripping tool is subsequently mounted on the cable outer coat via a necessary spacer, and after a certain tightening torque has been applied via a tightening bolt, the tension member is tightened, under a necessary torque, onto the tension member gripping tool via a tightening screw by using a tension member gripper. The edge plane panel is then pressed against a lower sleeve, and after the edge plane panel gasket has been fitted in a shape-accommodating fashion, an upper sleeve is capped, and the respective tighteners are sequentially tightened from the middle toward the outside in a state where the respective sleeves are being pressed against one another, whereas the final assembly is

obtained by tightening the same on several occasions under a certain torque; not only are the respective attachment postures of the cable sealing material and edge plane panel stabilized and fortified, but the hermeticity becomes greatly improved as well, and the obtained closure can be safely used by dispensing a gas via a valve.

[0006]

(Application examples)

The present invention will be explained with reference to the example of the closure shown in Figures 1 through 15 in possession of the cylindrical sleeve (1) and the edge plane panels (3) locked into the profile plane interlock unit (2) of the sleeve, according to which a matrix optical cable is fixed, after having been transmitted through the edge plane panels (3) and (3), by the cable gripping tool (4), and furthermore, the tension member of said cable is connected and linked to the tension member gripping tool (5). The aforementioned sleeve (1) is a cylindrical housing both sides of which along the axial direction thereof can be divided, via separated junction planes, into upper and lower members, and it may be constituted by a synthetic resin such as a PP resin, a flame retardant FRPP filled with a glass fiber, a styrenic or olefinic thermoplastic elastomer, etc., /3 whereas it possesses oppositional junction planes prevailing as a pair of lengthwise divisions along the axial direction as well as the edge plane panels (3), which are locked into both terminals of

said sleeve (1) (e.g., rubber sleeves of EPDM, etc. endowed with various excellent performances such as weather resistance, ozone resistance, etc.), whereas at least one cable insertion hole(s) (20) is formed on each of said edge plane panels (3), whereas the thin cap unit (21), which is capable of blanketing and separating said cable insertion hole(s) (20), is integrally attached to said hole, and at the same time, the slit (22), which is linked to the cable insertion hole(s) (20), is configured to punch through the edge plane panel outer plane for providing a constitution capable of expanding the terminal cut & opened via said slit (22). Additionally fixed & mounted, furthermore, is the linkage tool (8), which includes junction planes that oppose said edge plane panels (3), which possess depressed channels (6) capable of locking and holding the gasket (7) on the divided junction planes of the aforementioned sleeve (1), wherein the cable gripping tool (4) made of a pressing & holding piece is fitted along the cable outer circumference, and wherein the tension member gripping tool (5) and the tension member connector (9) are configured on the inner plane thereof opposing the edge plane panel (3); moreover, the buckle (30), which tightens the respective oppositional junction planes of the divided sleeves, is installed; if necessary, furthermore, the band (12) in possession of the tightener (11) made of a screw may be wound, in a detachable fashion, around the outer circumference of the aforementioned sleeve (1) for achieving linkage in a state where the separation plane hermeticity has been elevated.

[0007]

This band (12) is formed by a belt-shaped metallic sheet, etc. that can be wrapped around the sleeve (1), whereas hooks are configured at both of its terminals in such a way that the bolt (11) can be screwed via an engagement piece engaged with said hooks and that the respective hooks can be mutually contacted or separated, whereas it is also possible to configure jutting ribs (not shown in the figure) on the outer circumference of the sleeve (1) and to wind and strap the band (12) around the depression between the ribs for contributing to the prevention of detachment.

[0008]

As an upper & lower dividable morphology of the aforementioned sleeves (1), a sealing material is orchestrated to intervene between the respective edge plane panels (3) in an attempt to maintain the hermeticity together with the aforementioned sleeve gasket (7), whereas mutually opposing junction planes are designed to become linked and integrated via a fixation mechanism. In other words, either end of the longitudinal direction of the sleeve is linked via a hinge mechanism (fixed hinge or detachable hinge), whereas the buckle (30) capable of applying a tightening or tightening [sic] force [or] tightness amplifying force is installed at the other end (Figures 9 through 15).

The aforementioned edge plane panel (3), furthermore, is formed by a Japanese gold coin-shaped, elliptical, and/or circular rubber elastomer, whereas its multiple cable insertion holes (20)

each possess thin cap units (21) in such a way that said thin cap units (21) can be selectively cut & opened and used as punch-through holes, whereas cable insertion holes in possession of slits (22) slanted in relation to the horizontal plane are hereby orchestrated for facilitating the insertion of the cable, whereas [said holes are] possessed by the depressed plane units (23), which locks & retains the connection piece (24) in a state where they straddle over both sides of said slit (22) [sic], whereas a constitution wherein a tightening force is applied by the connection piece (24) in a state where the sealing component (25) is being contacted with the slit (22) is hereby provided in such a way that the cable insertion holes will be punched through between the inside and outside of the closure (Figures 5 through 8).

[0009]

Incidentally, punch-through holes or cable lead-out holes formed by the aforementioned cable insertion holes (20), (20) are wrapped with the spacer (43) made of a rubber, etc. or an air-tight tape as a measure for ensuring hermeticity on the outer circumferential plane of the cable. Configured on one side of the hollow and cylindrical spacer (43), which is orchestrated around the cable retrieved from the aforementioned sleeve (1), is the cable interface & insertion slit (44) for enabling the expansion of said spacer (43) along one direction, whereas ring-shaped mountain channels (45) & (46) are preferably configured respectively on the inner and outer circumferences of the spacer

(43) for facilitating the establishment of hermeticity and for simplifying (dis)assembling & handling operations (Figure 16).

[0010]

A rubber elastomer is used as this spacer (43) in a natural environment, and accordingly, spacers responsive to pressure variations [are configured] between the outer circumference and sleeve [and] between the inner diameter [sic: presumably "circumference"] of the cable insertion hole and cable outer circumference as measures for securing the compressive stress and for preventing low-temperature shrinkage by minimizing the pressure variation; the spacer (43), furthermore, is slit for facilitating the cable insertion, whereas multiple ring-shaped mountain units protrude from the outer circumferential plane and/or inner circumferential plane. In a case where cables with mutually different outer diameters are inserted into the cable insertion holes (20) of the aforementioned edge plane panel (3), it is desirable, from the standpoint of enabling responses by using insertion holes of an identical diameter, to embody a structure capable of securing hermeticity by using a cable spacer (43) the outer diameter of which is identical to that of the insertion hole and the inner diameter of which corresponds to the cable outer diameter, by configuring mountain channels on the inner and outer diameters [sic: presumably "circumferences"] thereof, and by setting [said spacer] on the cable.

[0011]

The cable gripping tools (4) & (4), furthermore, are attached, via attachment screws, to both terminals of the linkage tool (8) attached fixedly to the sleeve (1) in opposition to the inner plane side of the aforementioned edge plane panel (3), followed by the attachment, via a fixation screw, of a tension member to the gripping tool (5), whereas a housing attachment tool [e.g., housing tray (15)] in possession of a pair of rings (14) & (14) is configured in the middle thereof, whereas the tension member connector (9) is configured for enabling the distribution, guidance, and connection of a core wire (Figures 1, 17, and 18).

[0012]

The aforementioned cable gripping tool (4) is characterized, as Figure 17 shows, by a structure wherein the curved retention piece (17), which is extended along the cable outer circumference, is configured, via the pin (18), on the receptacle (16) in possession of the cable insertion depressed units (16₁) in a freely swiveling fashion for enabling opening/closing actions and wherein the cable is retained and fixed via the screw (19) for facilitating the grip of the cable. In other words, such a constitution for gripping the cable is comprised of the receptacle (16), on which multiple cable insertion depressed units (16₁) are integrally configured, the curved retention piece (17), which is pivotally attached, in a freely swiveling fashion, to said receptacle (16) via a hinge mechanism constituted by the pin (18), and the attachment screw (19), which attaches and detaches said curved retention piece (17) to and from the aforementioned

receptacle (16), whereas multiple mountain-shaped protrusions are configured on the inner plane of the receptacle and the inner plane of the curved retention piece for the purpose of obtaining a gripping force biting into the cable outer circumference. Incidentally, the aforementioned curved retention piece (17) may also be characterized by a detachable structure in relation to the receptacle (16).

[0013]

The tension member(s) attached to the tension member gripping tool (5), furthermore, may be of the single- or multiple-hole type, whereas one or multiple cable insertion units are configured, via an arm, on an attachment panel, and it is attached fixedly to the interior of the sleeve (1) for retaining the cable. The cable tension member gripper (51) may, for example, be embodied by orchestrating, via one or multiple arm(s) (48), the punch-through unit (47), which punches /4 through the cable, on the handling panel (49), as Figure 19 indicates, and by orchestrating the fixing & tightening screw (50) on the aforementioned punch-through unit (47), whereas in a case where it is attached to the aforementioned tension member gripping tool (5), a mounting operation wherein a tension is impressed on the center of one or multiple cables can be facilitated. Incidentally, the protection of the closure connection unit is ensured by configuring a gas dispensing gate equipped with a valve (not shown in the figure) on the aforementioned sleeve (1) or edge

plane panel (3) and by dispensing a sealing gas via said gas dispensing gate.

[0014]

In a case where a connection unit of such a structure is assembled, the spacer (43) is mounted on each cable, or a cable sealing material is wound around the same, and after the outer coat at the cable terminal has been fixed via the cable gripping tool (4), the respective junction planes of the divided sleeves (1) & (1) are disposed to oppose the junction planes of the edge plane panels (3) by configuring the gasket (7) on the junction plane of the sealing material and sleeve (1), and they are fixed by tightening the buckle (30) located on the outer circumference of said sleeves and by further wrapping the band (12) equipped with the tightener (11), based on which the hermeticity can be securely maintained over the entire length of the sleeve (1) by attaching and tightening the buckles (30) repeatedly via a certain interval, and a hermetic structure with a high reliability can thus be provided. Incidentally, since the gaskets (7) are compressively retained between the lengthwise divided junction planes along the diametrical direction in this assembly state, a high level of hermeticity can be maintained with a relatively low pinching force. Due to the intervening configurations of the sleeve between the edge plane panel (3) and the cable and of the sealing material along the cable longitudinal direction, furthermore, effects of stabilizing the postures of the sleeves (1) & (1) and of facilitating the assembly can be achieved, and

furthermore, the hermeticity can be significantly improved. Such a sleeve gasket (7) is characterized by a rectangular cross-sectional shape with rounded corners, and depressed channels are formed on its upper and lower planes for exerting lip effects and of improving the assembling efficiency and hermeticity.

[0015]

In a case where the tightened state of the aforementioned sleeves (1) & (1) is cancelled, on the other hand, the bolt of the tightener (11) is loosened, and after the band (12) has been detached from the sleeves (1) & (1), the tightening force of the buckle (30) is cancelled, and after the connection piece (24) configured as a slit opening stopper has been detached from the edge plane panel (3), the respective junction planes of the sleeves (1) are separated and divided, based on which an effect of facilitating a cable exchanging operation can also be served.

[0016]

A hinge mechanism embodied by the hook hinge (27) and the insertion hole (28) is configured, in a manner corresponding to Figure 2, on the divided edges of the aforementioned sleeves (1) for enabling attachment/detachment, and thus, the upper and lower sleeves (1) & (1) can be easily joined by locking said hook hinge (27) with the insertion hole (28) on an operation site and by then strapping and tightening the buckle (30) on them. In other words, the aforementioned hinge mechanism may be constituted by multiple pins and insertion holes corresponding to the former, or a fixed hinge or detachable hinge may be provided by configuring, either

in a fixed or detachable fashion, a singular support rod that punches through multiple insertion holes.

[0017]

Incidentally, four cable insertion holes (20) with mutually identical or different diameters are configured, via rubber spacers, on the aforementioned edge plane panel (3), as Figures 5 through 8 indicate, whereas slits (22) corresponding to the respective holes are concomitantly formed, whereas a morphology for inserting and locking a cable is provided by opening their terminals, whereas the disparity between the diameter of the cable insertion hole (20) and the cable diameter is negotiated via the edge plane panel (3). A junction seam spacer obtained by configuring mountain channels on both planes of a plastic is provided at an intermediate position of the aforementioned slit (22) as an insertion-abled structure, whereas the diagonal slit (22) is closed by one plane of the edge plane panel (3) and the thin outer circumference of the same in a case where no cable has been inserted, whereas it can be opened by cutting the cap unit (21) in a case where a cable is inserted, and thus, attempts are made to improve the operative efficiency and the reliability of hermeticity. In a case where the aforementioned slit (22) is used in a cut & opened state, the connection piece (24) is configured auxiliarily on the depressed plane unit (23) as an opening stopper mechanism for preventing the opening and/or distortion of an outer circumferential portion which has been cut & trimmed during a re-closing process that follows the cable insertion. Multiple

mountain channels (26), furthermore, are configured over the entire circumference of the outermost circumferential plane of the edge plane panel (3), based on which a hermetic state is maintained under the pervasion of a compressive force vis-à-vis the sleeve inner plane, and hermeticity in relation to the cable is concomitantly achieved under the pervasion of a compressive force transmitted to the interior. In other words, mountain channels (26) are configured on the outer circumference of the edge plane panel (3) as a mechanism for maintaining the hermeticity between the interlock unit (2) of the sleeve (1) and the edge plane panel (3), whereas an effect of maintaining the hermeticity is achieved based on the reception of the tightening force of the band by the sleeve (1) and the transmission of the same to the mountain channels (26), and since an edge plane panel gasket becomes unnecessary, the (dis)assembling operative efficiency can be improved.

[0018]

The housing tray (15) of the aforementioned core wire attachment tool is, as Figure 18 indicates, constituted to permit the mounting of 5 ~ 20 tapes/tray based on the single tape individual fixation format, whereas such housing trays are stacked in multiple steps and then linked via hinge units for enabling the opening of a necessary tray position and for improving the operative efficiency. Incidentally, the aforementioned sleeve (1) is constituted by a pair of cylinder halves that can be lengthwise divided into upper and lower members along the longitudinal

direction, whereas the thickness of the sleeve (1) is progressively enlarged toward the division junction plane, and furthermore, the depressed channel (6) is formed on the outer junction plane for ensuring the perpetuation of hermeticity, although a direct cable insertion morphology may instead be provided by eliminating the aforementioned edge plane panel (3).

[0019]

An assembled hermetic structure for the sleeve may, furthermore, be provided by selecting the edge plane panel (3) shown in Figures 20 and 21, where multiple mountain channels (26) are configured over the entire outer circumference of said edge plane panel (3) for securing a compressive force in relation to the sleeve inner plane and for maintaining the hermeticity in relation to the cable under the pervasion of a compressive force transmitted to the interior. If necessary, furthermore, the central spacer (29) may be configured on the aforementioned edge plane panel (3), whereas the thin cap units (21) formed respectively on multiple cable insertion holes (20) can be selectively cut & opened for enabling their uses as punch-through holes; moreover, the slit (22), which may be slanted or parallel in relation to the horizontal plane, is configured for facilitating the cable insertion, whereas a connection piece that straddles said slit (22) on both sides is orchestrated on the depressed plane unit (23), which locks and retains the former, and a constitution wherein a tightening force is applied by the connection piece in a state where the sealing component (25) is

being contacted with the slit (22) is provided, and the cable insertion holes (20) are designed to be punched through on the inside and outside of the closure.

[0020]

/5

A detachable hinge constituted by the pin hook hinge (27) and an insertion hole is orchestrated, as Figure 22 shows, on either side of the longitudinal direction of the sleeve division edge as a mechanism for hermetically fixing the respective divided junction planes of the aforementioned sleeves (1) & (1), whereas the other side of the same is designed to be optionally tightened via the rotatable buckle (30) in an attempt to improve the operative efficiency, whereas the sleeve gasket (7) configured on the depressed channel (6) on the hinge side is designed to become rotated along a direction for closing the sleeve (1) around said hinge as a pivot and then automatically stored in the respective depressed channels (6) of the upper & lower sleeves (1) & (1). The hinge mechanism may, furthermore, be fixed to the upper & lower sleeves (1), or a detachable mechanism may instead be embodied by mounting a pin on either sleeve along the longitudinal direction and by configuring a paired oppositional insertion hole on the other sleeve. It is desirable for the aforementioned buckle (30) to be embodied by a tightness amplifying mechanism capable, in a state where hooks have become hooked and where the upper & lower sleeves (1) & (1) have become mutually tightened till the achievement of a certain dimensional gap based on a

single-touch handle operation, of further closing said dimensional gap (e.g., screw rod & nut).

[0021]

(Effects of the invention)

The following edge plane panel constitution is provided by the present invention: In a closure wherein oppositional junction planes yielding a pair of divisions are formed along the axial direction of a cylindrical sleeve which surrounds and blankets a cable connection unit and edge plane panels which are punched through by cables on both sides of the aforementioned cable connection unit are possessed by said sleeve and wherein mutually opposing junction planes of said sleeve are linked and integrated via a fixation mechanism, at least one cable insertion hole(s) is formed on the aforementioned edge plane panel, whereas a slit linked to said cable insertion hole(s) is configured to punch through the outer plane of the edge plane panel, whereas the terminal cut & opened by said slit is expanded, based on which it becomes possible to tighten mutually opposing sleeve junction planes via a tightener with ease and to significantly accelerate an operation for housing the coat of a cable connection unit; moreover, the edge plane panel is evenly pressed at small numbers of tightening sites, based on which a high hermetic sealing reliability can be secured, and since the sleeve posture also becomes stabilized, a favorable handling efficiency can be achieved, and the assembly operation is facilitated, based on

which an inexpensive morphology with a simple constitution which enables effortlessly and safe connection & fixation operations can be provided.

Brief explanation of the figures

Figure 1: A diagram which shows an oblique view of a operative state where the interior is bared by means of partial cutting & separation with regard to an application example of the present invention.

Figure 2: A diagram which shows a partial isolated oblique view of the sleeve of Figure 1.

Figure 3: A frontal view diagram corresponding to Figure 2.

Figure 4: A diagram which shows a partially dissected profile view of the assembled state of the example of Figure 1.

Figure 5: A diagram which shows a magnified frontal view of the edge plane panel of the example of Figure 1.

Figure 6: A diagram which shows a plane view of the cross section along the A-A line in Figure 5.

Figure 7: A diagram which shows a plane view of the cross section along the B-B line in Figure 5.

Figure 8: A diagram which shows a profile view of Figure 5 from the outside.

Figure 9: A diagram which shows a partially dissected profile view of the sleeve of Figure 1.

Figure 10: A bottom plane view diagram pertaining to the example of Figure 9.

Figure 11: A diagram which shows a frontal view of the cross section along the C-C line in Figure 9.

Figure 12: A diagram which shows a frontal view of the cross section along the D-D line in Figure 9.

Figure 13: A diagram which shows a frontal view of the cross section along the E-E line in Figure 9.

Figure 14: A diagram which shows a magnified frontal view of the cross section along the F-F line in Figure 10.

Figure 15: A diagram which shows a magnified frontal view of the cross section along the G-G line in Figure 10.

Figure 16: With regard to an application example of sleeve, (a) is a profile view diagram, whereas (b) is a frontal view diagram, whereas (c) is a lengthwise cross-sectional view diagram along the Y-Y line.

Figure 17: A diagram which shows a frontal view of the cable gripping tool of the example of Figure 1.

Figure 18: With regard to the housing tray of the example of Figure 1, (a) is a profile view diagram, whereas (b) is a corresponding plane view diagram.

Figure 19: With regard to an application example of cable tension member gripper, (a) is a profile view diagram, whereas (b) is a corresponding plane view diagram.

Figure 20: With regard to another application example of edge plane panel, (a) is a profile view diagram, whereas (b) is a partially dissected plane view diagram, whereas (c) is a lengthwise cross-sectional view diagram.

Figure 21: With regard to still another application example of edge plane panel, (a) is a profile view diagram, whereas (b) is a partially dissected plane view diagram, whereas (c) is a profile view diagram.

Figure 22: A diagram which shows an oblique view of another example of the sleeve of the present invention in a partially dissected state.

(Explanation of notations)

- (1): Sleeve;
- (2): Profile plane interlock unit;
- (3): Edge plane panel;
- (4): Cable gripping tool;
- (5): Tension member gripping tool;
- (6): Depressed channel;
- (7): Sleeve gasket;
- (8): Linkage tool;
- (9): Tension member connector;
- (11): Tightener;
- (12): Band;
- (14): Ring;
- (15): Housing tray;
- (16): Receptacle;
- (16₁): Cable insertion depressed unit;
- (17): Retention piece;
- (18): Pivot;

(19): Screw;
(20): Cable insertion hole;
(21): Thin cap unit;
(22): Slit;
(23): Depressed plane unit;
(24): Connection piece;
(25): Sealing component;
(26): Mountain channel;
(27): Hinge;
(28): Insertion hole;
(29): Spacer;
(30): Buckle;
(31): Bracket;
(32): Handle;
(33): Rotary component;
(34): Screw rod;
(35): Pin;
(36): Nut;
(37): Hook unit;
(38): Pin;
(43): Spacer;
(45) & (46): Mountain channels;
(51): Cable tension member gripper.

/6

Figure 1

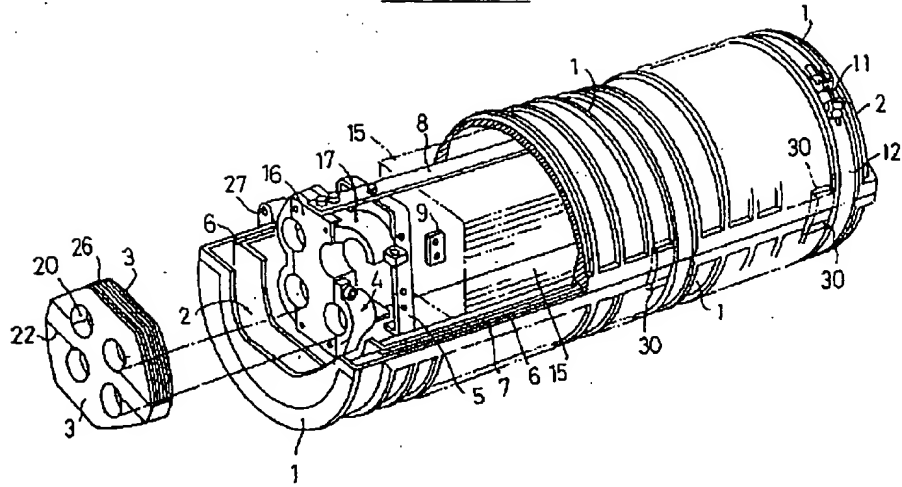


Figure 2

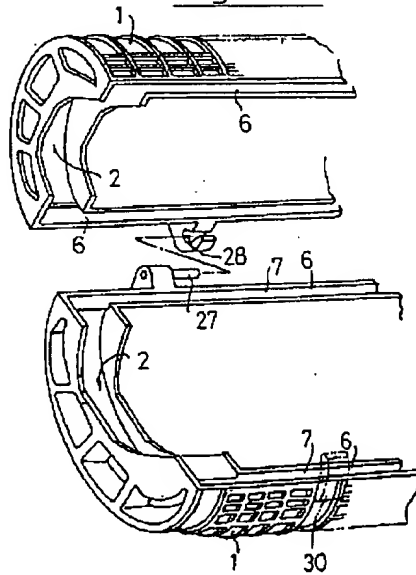


Figure 3

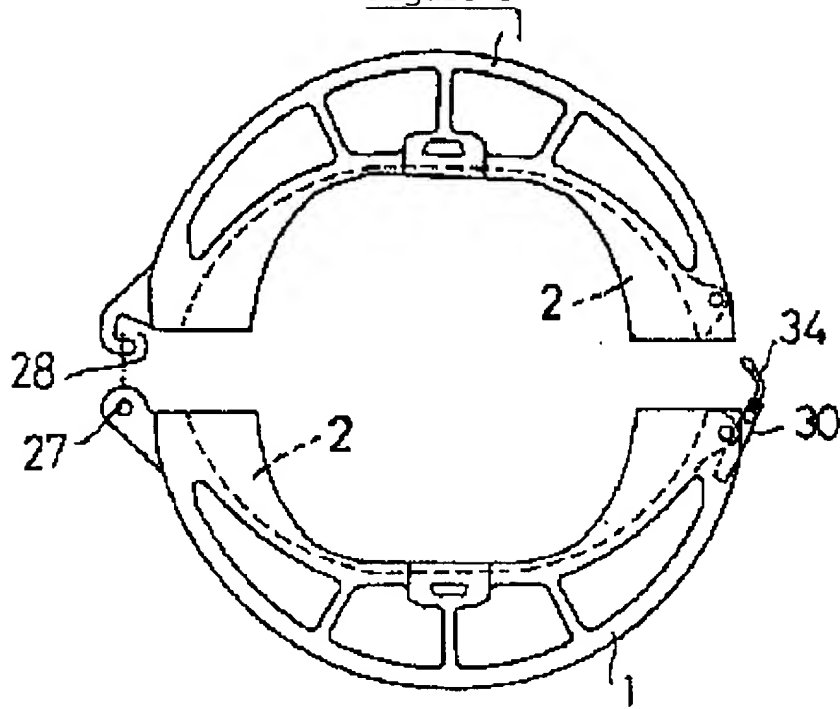


Figure 4

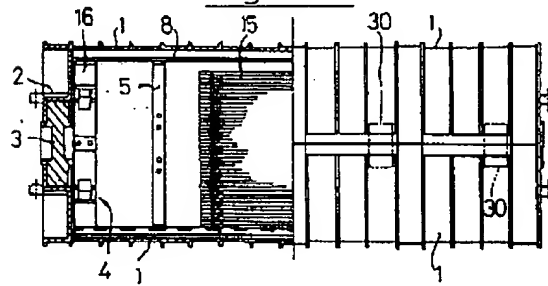


Figure 5

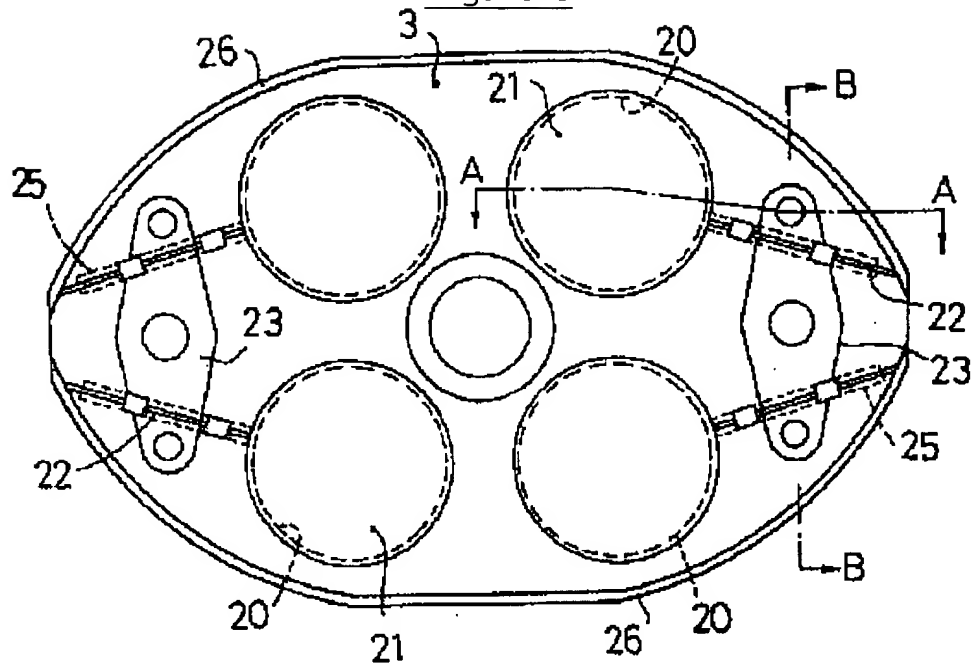


Figure 7

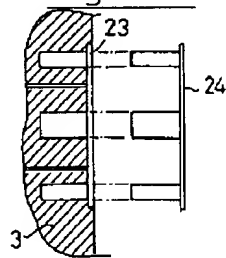


Figure 8

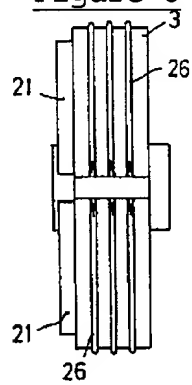


Figure 11

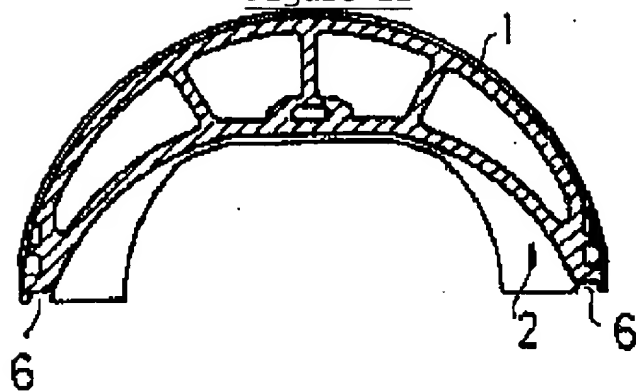


Figure 14

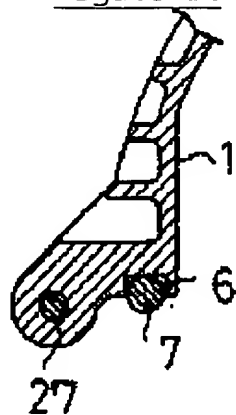


Figure 15

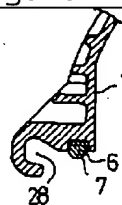


Figure 6

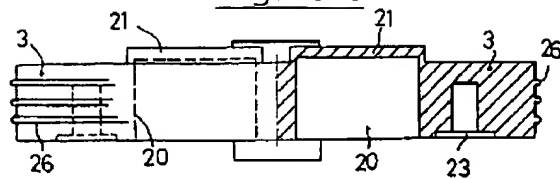


Figure 9

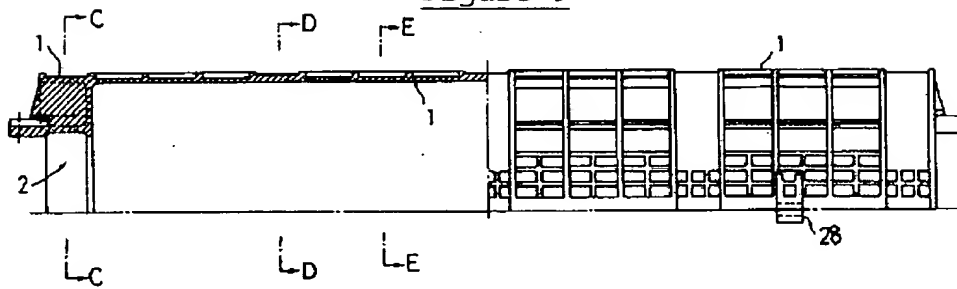


Figure 10

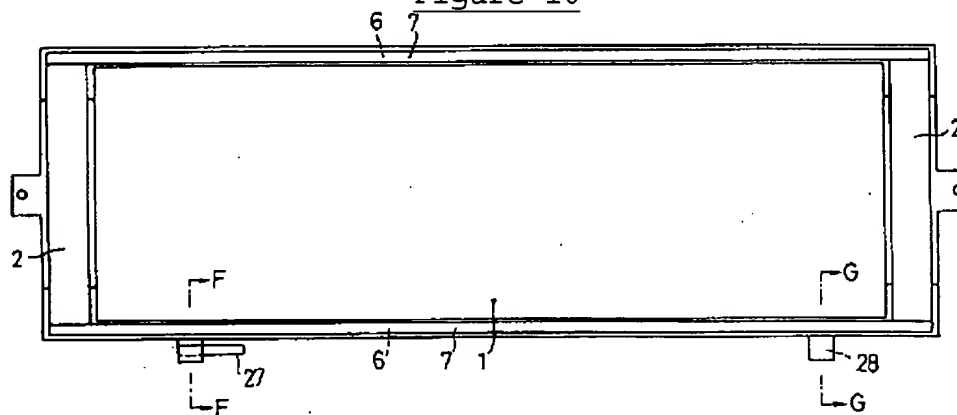


Figure 12

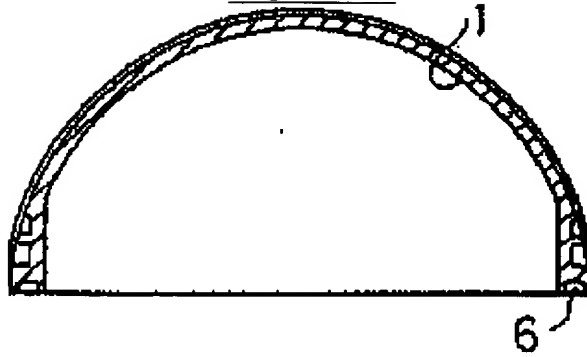


Figure 13

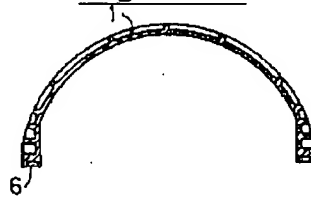


Figure 17

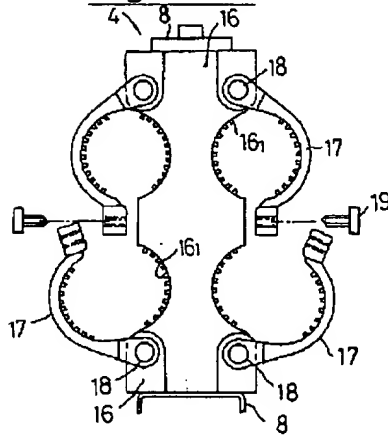


Figure 18

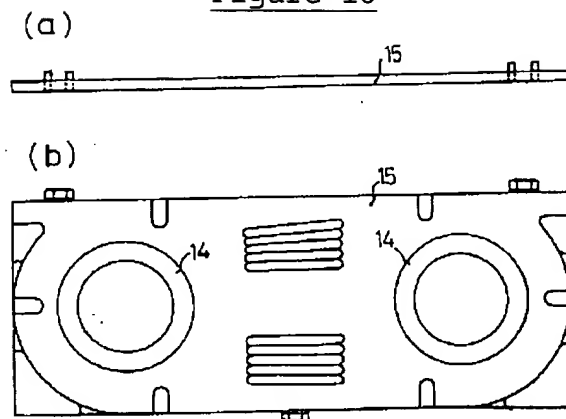


Figure 16

/8

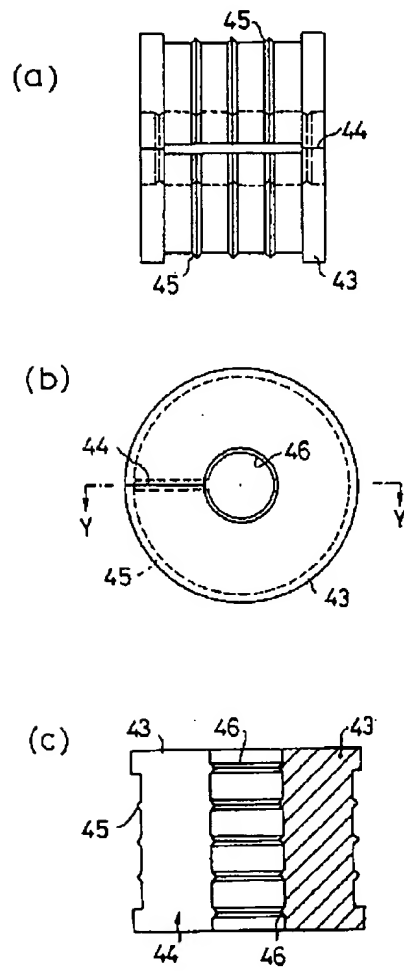
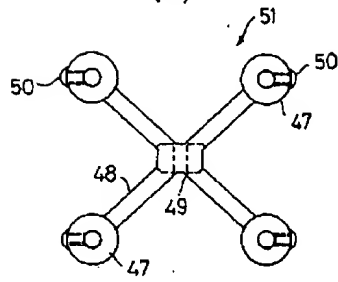


Figure 19
(a)



(b)

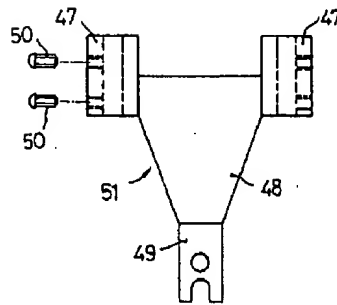


Figure 22

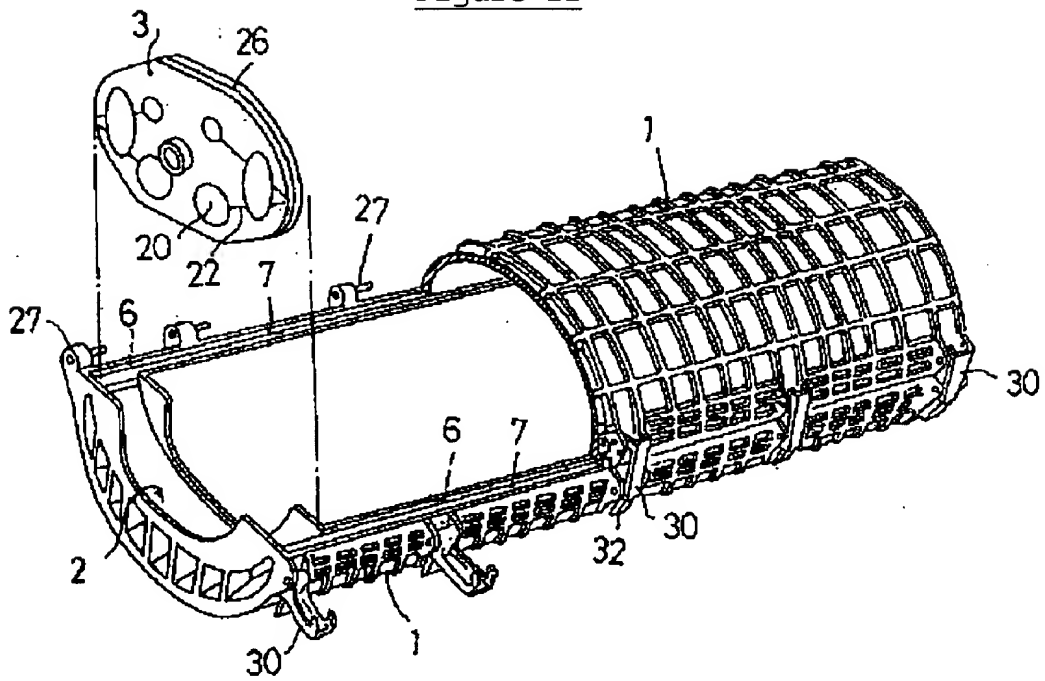


Figure 20

/9

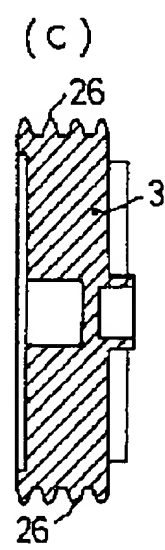
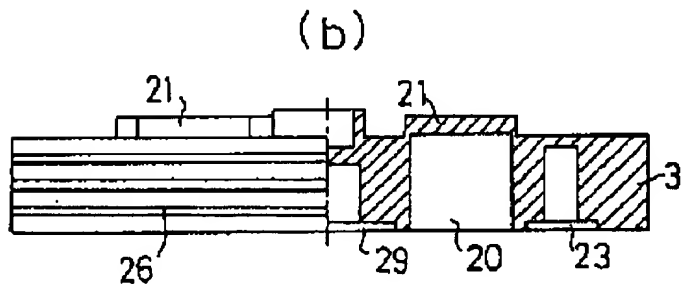
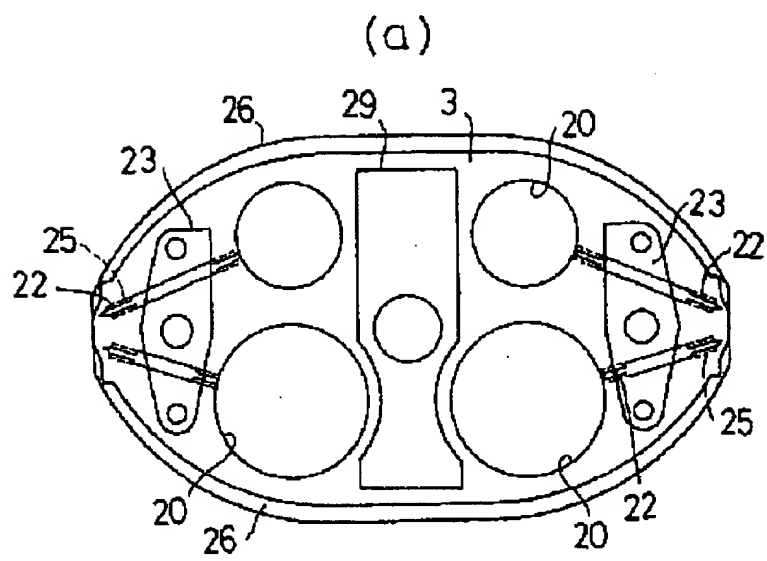


Figure 21

